

**REMARKS**

Claims 1-41 are in the case and presented for consideration. Claims 1-41 have been amended. No new matter has been added.

Claims 1, 7, 8, 11-18, 20, 21, 27, 28 and 31-38 have been rejected under 35 U.S.C. § 102 (b) as being anticipated by U.S. Patent 4,639,670 (Normann). Claims 2-6, 9, 10, 19, 22-26, 29, 30 and 39-41 have been rejected under 35 U.S.C. § 103 (a) as being unpatentable over Normann. With respect to this rejection, the Examiner has stated:

Normann discloses all of the claimed subject matter except for determining coordinate and the specific structural details of the core. These feature are considered obvious matters of design choice since applicant has not placed any criticality on these limitations.

With respect to these rejections, the Applicant traverses as follows. Although Normann discloses a magnetic field sensor comprising Wiegand wires, there is absolutely no teaching, suggestion or even inference that this sensor could be used as a position sensor in a medical device. Moreover, when focusing specifically on the teachings in the Normann reference, it is clear that the Normann sensor is entirely incapable of being used as a position sensor in a medical device such as found with the Applicant's claimed present invention. Particularly, not only does the Normann sensor have dimensions that far exceed the position sensor of the Applicant's invention (Normann sensor Wiegand wire having a length of 18 mm and each winding having a length of 15 mm as indicated at Column 6, Lines 5-10), but the Normann sensor is used in conjunction with a light emitting diode (as a transmitter diode) for an optical fiber link. See Column 5, Lines 13-16. Thus, it is clear that Normann is directed toward a sensor for use in an optical fiber link while the present invention is directed toward a distinct and non-obvious invention such as a position sensor in a medical device.

The Applicant also respectfully disagrees with the Examiner with respect to the Applicant's novel aspects of the Applicant's claimed invention such as the ability to determine location coordinates and the "specific structural details of the core", i.e. the claimed features of the Applicant's invention. The Examiner has considered these novel features and functions as

“obvious matters of design choice since Applicant has not placed any criticality on these limitations.” The Applicant would like to point out that the importance of using a position sensor having a core made of a Wiegand effect material as a position sensor in a medical device is indeed addressed in the Applicant’s Specification. For instance, one important aspect for the Applicant’s claimed invention is to ensure accuracy of the location information (position and/or orientation coordinates) of the position sensor in the body of a medical device, i.e. maintaining a high degree of accuracy at high temperatures. See Specification Page 4, Lines 25-29 and Page 19, Line 9 – Page 24, Line 15.

Additionally, the importance of the Applicant’s claimed invention with respect to structural details of the core and the position sensor itself is clearly specified in the Applicant’s Specification, for example, ability to use the position sensor in a medical device in conjunction with a position determining system such that the device has superior maneuverability and ease of access to remote locations within a patient’s body as well as the advantage of occupying a smaller portion of the cross-sectional area of the position sensor which would leave more space for functional apparatus and/or working channels within the device itself (if required). See for example, Specification, Page 4, Lines 19-24.

Turning now to the Applicant’s claimed invention, Claim 1 and Claim 20 have been amended in order to more particularly point out the Applicant’s claimed invention. Claim 1 (Amended) is directed toward a position sensor comprising a body; and a position sensor at a portion of the body such that the medical device has a core made of a Wiegand effect material and a winding circumferentially positioned around the core wherein the position sensor provides signals that determine location coordinates of the portion of the body of the medical device. Claim 20 (Amended) is directed toward a medical device comprising a body; and a position sensor at a portion of the body such that the position sensor has a core made of a high permeable material wherein the material is a magnetic material that produces a magnetic field that switches polarity and causes a substantially uniform voltage pulse upon an application of an external field and wherein the position sensor provides signals that determine location coordinates of the portion of the body of the position sensor. The support for both of these amended claims can be

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found in the Applicant's Specification, for example, Page 9, Lines 20-23; Page 10, Lines 4-18; Page 19, Lines 1-5; Page 19, Lines 9-15; and Page 20, Lines 13-20.


It is clear that Normann does not describe, suggest or even infer a medical device such as found in the Applicant's claimed invention as amended. This is especially true since the Normann sensor is clearly directed toward a device used for an optical fiber link. Thus, it is not in any way clear how one of ordinary skill in the medical field would be not only lead to the Normann reference, but also be lead to modify this reference in order to arrive at the Applicant's claimed present invention. Thus, Claim 1 (Amended) and Claim 20 (Amended) are neither anticipated by nor rendered obvious by Normann.

Claims 2-19 depend either directly or indirectly from amended Claim 1 and further patentably distinguish over the Normann reference. Claims 21-41 depend either directly or indirectly from amended Claim 20 and also further patentably distinguish over Normann.

Accordingly, by this Amendment and for the reasons listed above, the present invention is both patentably distinct and non-obvious over the prior art of record and favorable action is respectfully requested.

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page(s) is/are captioned "Version with markings to show changes made".

Respectfully submitted,

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**VERSION WITH MARKINGS TO SHOW CHANGES MADE**

**In the Specification:**

Please delete the title and substitute a new title as follows:

MEDICAL DEVICE WITH POSITION SENSOR HAVING CORE WITH HIGH PERMEABILITY MATERIAL FOR DETERMINING LOCATION COORDINATES

[POSITION SENSOR HAVING CORE WITH HIGH PERMEABILITY MATERIAL]

**In the Claims:**

Claim 1. (Amended) [A position sensor for] A medical device [, the position sensor] comprising:

a body;

a position sensor at a portion of the body, the position sensor having a core made of a Wiegand effect material; and a winding circumferentially positioned around the core, the position sensor providing signals that determine location coordinates of the portion of the body.

Claim 2. (Amended) The [position sensor] medical device according to Claim 1, wherein the position sensor is used to determine position coordinates.

Claim 3. (Amended) The [position sensor] medical device according to Claim 2, wherein the position sensor is also used to determine orientation coordinates.

Claim 4. (Amended) The [position sensor] medical device according to Claim 1, wherein the position sensor maintains accuracy of  $\leq 1$  mm at temperatures greater than 75°C.

Claim 5. (Amended) The [position sensor] medical device according to Claim 4, wherein the position sensor maintains accuracy of  $\leq 1$  mm at temperatures at approximately 80°C.

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Claim 6. (Amended) The [position sensor] medical device according to Claim 1, wherein the core has an outer diameter less than approximately 0.3mm.

Claim 7. (Amended) The [position sensor] medical device according to Claim 6, wherein the core has an outer diameter of about 0.25mm.

Claim 8. (Amended) The [position sensor] medical device according to Claim 7, wherein the winding is attached to the core.

Claim 9. (Amended) The [position sensor] medical device according to Claim 8, wherein a combination of the core and the winding has an outer diameter less than approximately 0.5mm.

Claim 10. (Amended) The [position sensor] medical device according to Claim 9, wherein the combination of the core and the winding have an outer diameter of about 0.4 mm.

Claim 11. (Amended) The [position sensor] medical device according to Claim 10, wherein the material of the core comprises cobalt.

Claim 12. (Amended) The [position sensor] medical device according to Claim 11, wherein the material of the core further comprises vanadium.

Claim 13. (Amended) The [position sensor] medical device according to Claim 12, wherein the material of the core further comprises iron.

Claim 14. (Amended) The [position sensor] medical device according to Claim 13, wherein the material of the core comprises approximately 20%-80% cobalt.

Claim 15. (Amended) The [position sensor] medical device according to Claim 13, wherein the material of the core comprises approximately 2%-20% vanadium.

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Claim 16. (Amended) The [position sensor] medical device according to Claim 13, wherein the material of the core comprises approximately 25%-50% iron.

Claim 17. (Amended) The [position sensor] medical device according to Claim 13, wherein the material of the core comprises approximately 52% cobalt, 10% vanadium and 38% iron.

Claim 18. (Amended) The [position sensor] medical device according to Claim 8, wherein the winding is made of copper.

Claim 19. (Amended) The [position sensor] medical device according to Claim 3, wherein the position sensor has an accuracy within approximately 0.5 mm.

Claim 20. (Amended) [A position sensor for] A medical device comprising:

a body;

a position sensor at a portion of the body, the position sensor having  
a core made of a high permeable material, the material being magnetic  
material that produces a magnetic field that switches polarity and causes a  
substantially uniform voltage pulse upon an application of an external field,  
the position sensor providing signals that determine location coordinates of the  
portion of the body.

Claim 21. (Amended) The [position sensor] medical device according to Claim 20, further comprising a winding circumferentially positioned around the core.

Claim 22. (Amended) The [position sensor] medical device according to Claim 20, wherein the position sensor is used to determine position coordinates.

Claim 23. (Amended) The [position sensor] medical device according to Claim 22, wherein the position sensor is also used to determine orientation coordinates.

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Claim 24. (Amended) The [position sensor] medical device according to Claim 20, wherein the position sensor maintains accuracy of  $\leq 1$  mm at temperatures greater than 75°C.

Claim 25. (Amended) The [position sensor] medical device according to Claim 24, wherein the position sensor maintains accuracy of  $\leq 1$  mm at temperatures at approximately 80°C.

Claim 26. (Amended) The [position sensor] medical device according to Claim 20, wherein the core has an outer diameter less than approximately 0.3mm.

Claim 27. (Amended) The [position sensor] medical device according to Claim 26, wherein the core has an outer diameter of about 0.25mm.

Claim 28. (Amended) The [position sensor] medical device according to Claim 27, wherein the winding is attached to the core.

Claim 29. (Amended) The [position sensor] medical device according to Claim 28, wherein a combination of the core and the winding has an outer diameter less than approximately 0.5mm.

Claim 30. (Amended) The [position sensor] medical device according to Claim 29, wherein the combination of the core and the winding have an outer diameter of about 0.4 mm.

Claim 31. (Amended) The [position sensor] medical device according to Claim 30, wherein the material of the core comprises cobalt.

Claim 32. (Amended) The [position sensor] medical device according to Claim 31, wherein the material of the core further comprises vanadium.

Claim 33. (Amended) The [position sensor] medical device according to Claim 32, wherein the material of the core further comprises iron.

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Claim 34. (Amended) The [position sensor] medical device according to Claim 33, wherein the material of the core comprises approximately 20%-80% cobalt.

Claim 35. (Amended) The [position sensor] medical device according to Claim 33, wherein the material of the core comprises approximately 2%-20% vanadium.

Claim 36. (Amended) The [position sensor] medical device according to Claim 33, wherein the material of the core comprises approximately 25%-50% iron.

Claim 37. (Amended) The [position sensor] medical device according to Claim 33, wherein the material of the core comprises approximately 52% cobalt, 10% vanadium and 38% iron.

Claim 38. (Amended) The [position sensor] medical device according to Claim 28, wherein the winding is made of copper.

Claim 39. (Amended) The [position sensor] medical device according to Claim 23, wherein the medical device has an accuracy within approximately 0.5 mm.

Claim 40. (Amended) The [position sensor] medical device according to Claim 20, wherein the material of the core comprises a copper, nickel and iron alloy (CuNiFe).

Claim 41. (Amended) The [position sensor] medical device according to Claim 20, wherein the material of the core comprises an iron, chrome and cobalt alloy.